

DT-6663

**PRESSURE CONTAINER**

## **BACKGROUND OF THE INVENTION**

### **1. Field of the Invention**

The present invention relates to a pressure container having an inner container with a first chamber for receiving a first medium, an outer container having a second chamber for receiving a second medium and sealed with respect to the first chamber of the inner container, a cover for closing both the inner container and the outer container, and a valve provided in the cover for delivering one of the first and second media from one of the first chamber and the second chamber outwardly.

### **2. Description of the Prior Art**

Pressure containers of the type described above are used, *e.g.*, in gas-driven setting tools for storing fuel for driving the tools.

European Publication EP 0 017 147 discloses a conventional pressure container having inner and outer containers which are covered with a cover in which an outlet valve is provided, and which are connected with each other at their regions adjacent to the cover by a crimp. The bottom of the outer container has an

opening through which the outer container is filled with filling medium and which is closed with a plug.

In such a container, a liquefied hydrocarbon fuel for driving a setting tool is stored. In all of the known gas-driven power tools, at a high frequency of setting processes, the temperature of pressure capsules increases above 50°C. When the pressure in the pressure capsule increases due to heating, the amount of a metered amount can alter at a certain high temperature. With such heating of the pressure capsule, as a rule, the closing plug fails and is pressed out of the filling opening, which leads to an uncontrollable flow of the medium out of the outer container.

With pressure capsules without closing plugs, at a noticeable increase of the temperature, the crimp intersection between the cover and the inner container/outer container fails, resulting in a sudden, uncontrolled exit of gases.

Accordingly, an object of the present invention is a pressure container and a method of manufacturing and/or filling the pressure container capable to withstand substantially higher temperatures than conventional pressure containers and in which the drawbacks of the prior art, conventional containers are eliminated.

## SUMMARY OF THE INVENTION

This and other objects of the present invention, which will become apparent hereinafter, are achieved by providing, in the pressure container of the type discussed above a protective jacket for enclosing the outer container and having a bottom bulging toward a bottom of the outer container provided at an end of the outer container remote from the valve that is provided in the cover, with the protective jacket further having, at its end remote from its bottom, a crimp rim engageable with the crimp of the cover for supporting the cover.

With the crimp rim engaging the connecting crimp of the inner and outer containers and the cover by rolling over the crimp, the protective jacket formlockingly closes, at its open end, the cover. Thereby, the crimp rim of the protective jacket supports the connection point between the cover and the outlet edge of the pressure container, preventing pop-off of the cover at a high pressure.

In the pressure containers having a closing plug in the bottom, the bulging bottom prevents a premature failure of the closing plug at a high temperature. Therefore, a pressure container according to the present invention is particularly suitable for gas-operated setting tools.

Advantageously, the chamber in the outer container is formed as a propellant chamber for receiving a propellant, and the chamber in the inner container serves for receiving another filling medium. The two chambers are tightly sealed relative to each other, air-tight and liquid-tight.

The outer container can advantageously be filled, *e.g.*, with a hollow needle extendable through a closing plug that closes an opening formed in the bottom of the container. The chamber of the inlet container can be filled through an inlet/outlet valve located in the cover.

Advantageously, an opening or a hole is formed in the bottom of the protective jacket and which insures that a filling medium can be delivered to the outer container with the hollow needle, which extends through that opening or hole.

However, it is possible to mount the protective jacket over the outer container and form the crimp rim for closing the connection crimp after the inner and outer containers are filled with appropriate media, respectively.

The novel features of the present invention, which are considered as characteristic for the invention, are set forth in the appended claims. The invention

itself, however, both as to its construction and its mode of operation, together with additional advantages and objects thereof, will be best understood from the following detailed description of the preferred embodiment, when read with reference to the accompanying drawings.

### **BRIEF DESCRIPTION OF THE DRAWINGS:**

Single figure of the drawings shows a cross-sectional view of a pressure container according to the present invention.

### **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

A pressure container according to the present invention and which is shown in the drawing includes an inner container 10 and an outer container 20. The outer container 20 is formed of a relatively thick metal such as, *e.g.*, aluminum. The inner container 10 is formed by a relatively thin compound or sandwich foil. The sandwich foil is formed of, *e.g.*, three layers, an inner plastic layer such as, *e.g.*, a PE-welding layer, a metal layer or a foil, and a plastic outer layer, again a PE-welding layer. The metal layer, which is formed of aluminum, serves as a barrier layer for a liquid or gaseous medium such as, *e.g.*, fuel gas. A medium-proof cover 25, which separates the media from the outer atmosphere, closes both

openings of both containers 10 and 20. The two containers 10 and 20 are connected with each other and sealed from each other by a crimp 24. The inner container 10 encloses a chamber 11 for a filling medium 12, *e.g.*, a combustible liquefied gas. The filling medium 12 or the liquefied gas is held under pressure applied by a propellant 22 located in the propellant chamber 21 of the outer container 20. In the propellant chamber 21, the propellant 22 is contained in both liquid phase and gaseous phase. A valve 40 is located in an opening 41 formed in the cover 25. The valve 40 is sealed against the cover 25. The valve 40 includes an inlet/outlet component through which the filling medium or the liquefied gas can flow in the chamber of the outer container 20 or to another device connected with inlet/outlet component, *e.g.*, a metering member, metering device, and the like.

An inlet opening 27 of the pressure container is closed with closing means 29, *e.g.*, of rubber. For filling the outer container 20 with the propellant 22, *e.g.*, a hollow needle can be inserted through the closing means 29. The propellant 22 is fed in the propellant chamber 21 through the needle from a reservoir of propellant.

The outer container 20 is located in an outer protective jacket 30 formed of metal, *e.g.*, aluminum, and having a thickness greater than that of the outer

container 20. In the region of cylindrical wall portions 23, 33 of the outer container 20 and the protective jacket 30, respectively, the outer container 20 is fitted within the protective jacket 30 practically clearance-free, within manufacturing tolerances. The bottom 36 of the protective jacket 30 is provided, in the direction of the bottom 26 of the outer container 20, with a depression forming a bulge that supports the bottom 26 and, in particular, the closing means 29. This permits to maintain a high inner pressure in the outer container 20, without failure of the pressure container. The hollow needle for filling the outer container 20 can be inserted in the closing means 29 through an opening 27 in the bottom 36 of the protective jacket 30.

The protective jacket 30 is rolled over the cover 25 in the region of the cover 25, forming a crimp rim 34. The crimp rim 34 reinforces the crimp 24 between the outer container 20, the inner container 10, and the cover 25. In addition, the crimp rim 34 fixedly secures the protective jacket 30 on the pressure container.

It should be pointed out that the protective jacket can also be formed of several layers, with a first jacket layer forming the crimp rim, *e.g.*, and the second jacket layer forming the bulging bottom. Both layers or parts can be spaced from



one another. Generally, it is not necessary for the protective jacket wall not to have any holes or openings. Rather, the protective jacket can have a grid structure.

Though the present invention was shown and described with references to the preferred embodiment, such is merely illustrative of the present invention and is not to be construed as a limitation thereof and various modifications of the present invention will be apparent to those skilled in the art. It is therefore not intended that the present invention be limited to the disclosed embodiment or details thereof, and the present invention includes all variations and/or alternative embodiments within the spirit and scope of the present invention as defined by the appended claims.